



## STAR FIELDS

Newsletter of the  
Amateur Telescope Makers of Boston  
Including the Bond Astronomical Club  
Established in 1934  
In the Interest of Telescope Making & Using

Vol. 25, No. 9    October 2013

### This Month's Meeting...

Thursday, October 10<sup>th</sup>, 2013 at 8:00 PM

Phillips Auditorium

Harvard-Smithsonian Center for Astrophysics

Parking at the CfA is allowed for the duration of the meeting



Almach ( $\gamma$  Andromeda)-Takahashi FS128, Image by Al Takeda + John Blomquist

### Double Stars

This month's speaker will be Glenn Chaple – A longtime ATMoB member and mentor to many of you out on the observing field. Glenn is a knowledgeable and enthusiastic observer of double stars. He knows all there is to know and is going to give us a wonderful presentation on double stars – What they are and how to observe them as well as a little history of double star discovery and scientific research. Glenn is a retired middle school science teacher and has written or co-authored a number of books on astronomy and wrote the column on double stars for Deep Sky Magazine for over ten years. Please join us as he shares his extensive knowledge on the topic of double star observing.

Please join us for a pre-meeting dinner discussion at [Changsho](#), 1712 Mass Ave, Cambridge, MA at 6:00pm before the meeting.

### President's Message...

In August of this year we were witness to one of the more violent events in the universe – the explosion of a star or nova. This was Nova Delphinus 2013 discovered August 16th by two Japanese astronomers. At the time it was at magnitude 6.8 but brightened up to Mag 4.4 at its peak. This sort of thing has not happened since 1975 when we had Nova Cygni which reached a magnitude of 1.7 at its peak. There are many kinds of astronomical objects that we can observe such as galaxies, planets, the moon or sun. But simple stars can be exciting too - especially when we have a spectacular event such as Nova Delphinus unfolding before us. Finding it in the sky is the first challenge. But then what? Well we can photograph it; we can measure its brightness; we can even make spectroscopic observations to characterize the elements in the expanding gas shell that is the remnant of the initial outburst. And we can do all this for many months because what is really interesting now is how the brightness and spectral characteristics will change over time. This is where observation turns to science – if you are so inclined.

There are other kinds of stellar observations that you might consider as well. Along the same lines as this nova there are the observations of variable stars – a measurement of the change in brightness over time. Some stars vary over a short time frame. Other stars vary over a period of a year or more and the range of variation can be anywhere from one or two magnitudes to eight, nine or even ten magnitudes. There are also double stars of course which exhibit an intrinsic variation of their own. They vary in separation and position angle. No doubt this variation is very slow on a human time scale, so most of us usually resort to just looking at them for their inherent beauty. Nothing wrong with this; It doesn't have to be all science but if science is what you want there are definitely opportunities there to be had. If this kind of observing interests you you're in luck because this month's topic will in fact be double stars – the how, and the why and a little bit of the history of this sort of astronomical observation. Our speaker's enthusiasm for this kind of observing may just get you hooked. Come to the meeting and find out for yourself.

And do remember one thing too when it comes to observing mere stars! No matter what your light pollution situation is, be it local or regional, the "stars" will always shine through the glare even if only the bright ones like Nova Delphinus 2013.

~ Michael Hill – President ~



Moon and Venus at the Clubhouse. 9 September 2013. \*

## September Meeting Minutes . . .



Mario posing with the Schiaparelli Telescope. Image courtesy of Mario Motta

Minutes of ATMoB meeting held September 12, 2013.

Meeting held in Phillips Auditorium, Harvard-Smithsonian Center for Astrophysics.

Mike Hill, President: called the meeting to order at 8:00 PM.

- The Secretary's Report of the July 2013 meeting was given by Sidney Johnston.
- Nanette Benoit gave the treasurer's report.
- Tom McDonagh gave the Membership Committee Report. Tom mentioned that the ATMoB is a tax exempt charitable organization, and that contributions to the club have been very good. Also, Tom mentioned that renewals of membership and contributions are both available from the ATMoB web page, and payment can be by PayPal, check, etc. Also, the web page has blocks to check for renewal of subscriptions with a discount to *Sky and Telescope* and *Astronomy* magazines, and that if a subscription is presently in force the renewal will simply be attached to begin after the current subscription expires.
- Mike Hill gave the Observing Committee Report for Glenn Chaple, and mentioned the ATMoB Clubhouse Autumn Double Star Party.
- Bruce Berger spoke about the ATMoB Research and Imaging Observatory (ARIO), and mentioned that five people have completed the training. Also, several people have completed one day of the two day training. Bruce also discussed selling some telescopes and other equipment as surplus in order to raise money to buy equipment for club use.
- Steve Clougherty gave the Clubhouse Report in which he mentioned that work parties in both July and August accomplished much good work. Steve also mentioned that there is an effort to get the vacuum chamber for coating mirrors with aluminum working within the next year.

- Mike Hill thanked Eileen Myers, Nina Craven, Al Takeda, and everyone else who helped, for all of their good work in preparing for the club picnic.
- Mike Hill spoke in remembrance of Lou Cohen (1937 – 2013) who was a club member, AAVSO member, and was known for the observatory which he built at his home in Cambridge.
- Mike Hill spoke in remembrance of club member Faye Borison (1921 - 2013) who passed away in August.  
*Editor: Faye won 1st place in the 1969 Stellafane Convention Ladies Telescope Competition for building a 6-inch f/7 Newtonian.*
- Mike Hill mentioned events scheduled for the near future, including The Arcadia Night Sky Festival to be held in Bar Harbor September 26-30, 2013, Maine; AstroAssembly in Rhode Island given by Skyscrapers, Inc.; and the Double Star Party scheduled for October 11 at the Clubhouse.
- Old Business: None
- New Business: None

President Mike Hill introduced long-time club member Dr. Mario Motta, MD as the invited speaker. Mario is also President of The American Association of Variable Star Observers (AAVSO), plus many other offices and titles. The title of Mario's talk was "A Day in the Life of a 32 Inch Telescope Mirror".

Mario's talk described the life of his first 32-inch mirror. The blank glass was a gift from Mike Mattei. The blank had apparently been cast for use in a spy satellite, and was rescued from destruction by Mike Mattei. Mike and Mario sand blasted the back of the mirror at a tombstone factory in order to produce cavities in the back to reduce the weight of the final mirror. Sand blasting reduced an initial weight of 160 pounds to 76 pounds.

Using parts from a surplus ATMoB grinding machine, Mario built a grinding machine large enough to handle the 32-inch mirror and ground and polished the mirror surface with the help and guidance of Mike Mattei. Mario also built the telescope assembly for the mirror.

Mario ground and polished the mirror to about 1/4 wavelength, although the initial effort was to achieve about 1/7 wavelength accuracy. Mike Mattei made the secondary mirror. With the help of Paul Valleli, some hydrofluoric acid was obtained and the glass blank was etched in the acid to relieve stresses introduced by the sandblasting. The resulting telescope was f/4, and saw first light at Mario's observatory in New Hampshire in 1994.

After Mario obtained a better (1/12 wavelength accuracy) mirror the first 32-inch mirror was retired. It remained in retirement until 2012.

In 2012, Dr. Ulisse Munari of Padua University in Italy was on a sabbatical leave and visited Dr. Arne Hendon, the director of the AAVSO. Dr. Munari mentioned that the Schiaparelli Observatory, located above Lake Varese in Italy, had built a new observatory for spectroscopy. They had built a telescope assembly designed for a 32-inch f/4 primary, but did not have a mirror. At dinner at Mario's home, Mario mentioned that he had just such a mirror in his basement. After some disbelief, Dr. Munari was shown the mirror and he then exclaimed that "this would be a perfect mirror for the new observatory and telescope". Also, the quarter wavelength accuracy of the mirror is sufficient to make an excellent spectroscopy telescope.

The mirror was transferred to the AAVSO and then shipped to the Schiaparelli Observatory where it has been received in perfect condition. Soon an amateur crafted mirror will be in regular professional use in a spectroscopy telescope. The new telescope will be fully robotic and is located in the foothills of the Alps along the northern border of Italy with Switzerland, near Lake Varese.

Mario ended by saying that he feels very good that Mike Mattei's original intent to save the needless destruction of a perfectly good mirror blank has been accomplished. The mirror has gone through several iterations since it was originally cast: from spy satellite, to amateur observatory use, and now to professional research. He is pleased that the mirror will be productively used for many years to come.

Mario enjoyed a visit to the Schiaparelli Observatory where local streets and businesses were named "Mario Motta". He expects to visit Italy often and say hello to the mirror which he made.

Note: An article by Dr. Mario Motta, MD, President of the AAVSO published in the *AAVSO Newsletter*, Issue No. 56, published April 2013, provided information used in these minutes.

*Editor: Mario's 32-inch mirror story and photos can also be found in the April 2013 edition of "Star Fields", the ATMoB newsletter.*

The meeting was adjourned at 9:16 PM

~ *Sidney Johnston, Secretary* ~

## Board Meeting Announcement . . .

There will be board meeting on Tuesday, November 5th at the clubhouse in Westford. Any member wishing to sit in is welcome to do so. We will be discussing the issue of what to do with our extensive collection of telescopes that have been donated to us over the years. The meeting starts at 7:30 in the evening

~ *Michael Hill – President* ~

## Clubhouse Report . . .

September 2013



Spreading Loam. (L-R) Tom Wolf, Laura Sailor, Cheryl Rayner, Steve Clougherty. Image by Al Takeda

Our September work party was held on Saturday the 21st and a total of 21 members and guests volunteered for a long and arduous work day.

Dave Prowten spent the day finishing the work on the Barn sill. He replaced siding and applied a final coat of stain on the section of the wall above the sill. Thanks to Dave for completing a difficult job. Well done! Bill Toomey arrived with a small cadre of three students and two parents to lend a hand with cutting back the thick growth and brush on the West side of the driveway. The group made a lot of progress, and we now have a large clearing adjacent to the driveway. Once again, thanks to Bill and his student volunteers for all of their efforts this entire year.

Earlier during the week John Reed and Steve C. met with Wayne Legacy, the excavation contractor for Haystack. We arranged to have a total of four yards of loam delivered along with a ton of gravel/packer material. Wayne also retrieved his huge front end loader that same afternoon and removed a very large concrete slab which had been deemed a safety concern for observers in the observing field. Beginning at 10 AM, volunteers arrived for a very full day of yard work. No fewer than 10 helpers spread loam in the observing field, filling in low spots and leveling the area. The gravel/packer material was spread at one end of the driveway by John Blomquist using his tractor rake. John also used his tractor to help spread loam in the observing field. By 2 PM we finished the spreading and raking of loam and grass seed was planted. A very big thank you to all of the volunteers who were on hand for this very arduous task!

John B. and Karl Dean repaired a bent gear on the Cave mount located on the observing field.

Lunch was served for a pretty hungry crew by our most capable cooks Saturday afternoon.

We would like to thank Al Takeda for donating a much needed digital voltmeter and a new soldering iron tip to the Electronics room of the Clubhouse.

Many thanks to all of the friends and members who helped during the September work party. Thanks go to Bill Toomey and to his students and their parents: Catherine Amirault, J T Amirault, Justin Mello, Joe Bernardo, and Leanne and John Macdonald. And thanks go to Steve Clougherty, Joshua Ashenberg, Sai Vallabha, John Blomquist, Paul Cicchetti, Cheryl Rayner, Al Takeda, Eileen Myers, Tom Wolf, Art Swedlow, Laura Sailor, Samuel Anuta, Eric Johansson, Dave Prowten and Karl Dean.

~ *Clubhouse Committee Directors* ~  
 ~ *John Reed, Steve Clougherty and Dave Prowten* ~

**Clubhouse Saturday Schedule**

October 12	Joe Henry	Tom Lumenello
October 19	Bruce Berger + Mike Hill <b>WORKPARTY # 10</b>	
October 26	Neil Fleming	Bill Toomey
November 2	John Panaswich	Dave Siegrist
November 9	Henry Hopkinson	John Small
November 16	Bill Robinson + N. & S. Sonowane <b>WORKPARTY # 11</b>	
November 23	Art Swedlow	Sai Vallabha
November 30	George Paquin	Dave Prowten
December 7	Paul Cicchetti	Tom McDonagh
December 14	Steve Clougherty + Al Takeda <b>WORKPARTY # 12</b>	
December 21	Eric Johansson	John Reed

**Membership Report . . .**

Membership count as of September 25, 2013 is at 225 individuals

60 members have renewed their membership this month. If you have renewed, thank you!

**The membership renewal period begins in June and ends September 1st. Many *S&T* and *Astronomy Magazine* subscriptions are tied to the September deadline so don't delay in renewing membership and subscription payments! This will ensure you do not miss any magazine issues.**

**If you are a new or returning member in the 2013 calendar year, renewal payment is not required. If you have questions regarding your membership status, please contact me.**

A new class of membership is available this year. Consider a Family membership for yourself and direct family members.

The renewal process can be completed on-line using PayPal. No PayPal account is required. Follow the link below, login using your email address on record with the club. If you cannot gain access to the website, please contact me before renewing online.

<http://www.atmob.org/members/person.php?frid=renewals>

Renewal checks may also be mailed:  
 ATMoB  
 c/o Tom McDonagh  
 48 Mohawk Drive  
 Acton, MA 01720

The renewal form can be downloaded from the following link:

<http://www.atmob.org/about/join.php>

Contact me if you require a renewal form and do not have access to a computer / printer by phone (617-966-5221) or mail.

**Don't delay, renew today!**

Please take the time to seek out and welcome our new and returning club members:

Megan Kralj  
 James Clem  
 Hannah Potter

The Amateur Telescope Makers of Boston, Inc. is a 501(c)3 organization. Donations are gladly accepted and are tax deductible to the fullest extent allowed by law. Consider making a tax-deductible contribution to the club during your estate and tax planning this year. Many companies make matching contributions at an employee's request. This is a simple way to make your donation go twice as far.

~ *Tom McDonagh - Membership Secretary* ~

**2014 RASC Observer's Handbook . . .**

40 copies of the 2014 RASC Observer's Handbook will be ordered. I plan to sell them at the November monthly meeting. Any copies not sold then will be available at the December meeting. Handbooks will again be \$20 each.

The guide is published annually by The Royal Astronomical Society of Canada (RASC). It is a great annual reference for data and upcoming events in the sky. See <http://www.rasc.ca/observers-handbook> for more details.

~ *Eileen Myers - Member at Large* ~

**2014 Astronomy Calendars . . .**

I will once again be selling the Astronomy Calendars for \$8.00 a copy (retail price is \$12.95). Exact change will be greatly appreciated. I will only have 50 copies, so first come, first served. The club treasury will get about \$1.50 for each copy sold; great deal for you and the club!

~ *Submitted by Bernie Volz* ~

## Sky Object of the Month . . .

October 2013

NGC 6946– Spiral Galaxy in Cepheus

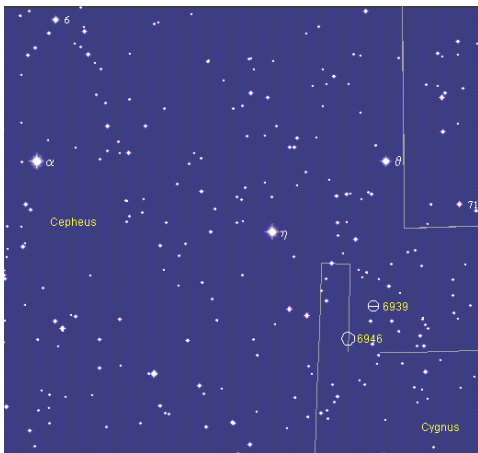


Image by John Mirtle ([www.astrofoto.ca](http://www.astrofoto.ca))

A mere 40 arcminute hop from last month's Sky Object (the open cluster NGC 6939) takes you 5000 times deeper into space to the face-on spiral galaxy NGC 6946. NGC 6946 was discovered by William Herschel on the same night – September 9, 1798 – that he notched NGC 6939.

Most sources assign to NGC 6946 a visual magnitude of 8.9. Don't be misled by this seemingly "bright" figure. As is the case with similar face-on galaxies like M33 and M74, the light is spread across a wide area (in this instance, 11 by 10 arcminutes), resulting in a very low surface brightness. Working with a 10-inch reflector on a recent evening, I could barely glimpse NGC 6946 as "a large, circular glow (averted vision only)." The limiting magnitude that night was 5 – not exactly a pristine condition. If you want to spot NGC 6946 with a small-aperture scope or tease out any kind of structural detail with a big Dob, you'll want to work under clear, magnitude 6 or better skies.

NGC 6949 has been nicknamed, the "Fireworks Galaxy." The moniker is appropriate. Since 1917, nine of its stars have erupted as supernovae - the last in 2008. This is an amazing figure when you consider that NGC 6946 is about half the size of our Milky Way Galaxy.



[www.nightskyinfo.com](http://www.nightskyinfo.com)

~ Glenn Chaple – Member at Large ~

## Picnic Thank You! . . .



The big tent. \*

This year we were fortunate to have the use of a huge tent provided by Bill Toomey. Bill and his brother set up the tent by themselves very early Saturday morning, long before the Picnic Committee arrived. Because of its size, we were able to set up many small tables and chairs under the tent, lending a pleasant outdoor café feel to the picnic.



Sundial wristwatch. \*

Activities for kids were led by Julie Kaufmann, Nina Craven, and Eileen Myers. This year Julie prepared constellation viewers using Pringles containers. Each constellation was hand created by the child from a master copy and inserted into the viewer – a great way to start learning the names of the constellations and the positions of the stars in the night sky. The outside of the viewer could be customized by the child, using various types of art supplies and stickers. Some of the other activities included making sun catchers, customized ATMob sundial wristwatches, solar bead bracelets and solar bead keychains, using solar nail polish, and drawing geometric shapes using the gears of a Spirograph. Everyone sixteen and under received a science-related door prize.



Hawk watching with Nina Craven and John Maher, \*



Star and heart shaped cucumbers. (L-R) Steve Clougherty and John Blomquist \*

Kids had fun running around with the party balloons in tow. Some enjoyed a simple game of ring toss. An unexpected visitor – a hawk – perched high up on the tower near the clubhouse and stayed for quite a while. John Maher, while giving talks and tours of the clamshell observatory, positioned the 10-inch Meade Schmidt-Cassegrain to allow many of us to have a good look at the hawk. John M. also opened the Ed Knight Observatory and spoke about the telescopes inside.

Bill Toomey led the walk “up the hill” and spoke a few words about each radio observatory. Mike Hill and his team set up a stand and demonstrated mirror grinding. Bruce Berger opened the ARIO observatory and talked about its operation the equipment inside. Unfortunately the day was cloudy, so there were no solar telescopes set up.



Bruce Berger in the ATMoB Research and Imaging Observatory. \*

Just as it was getting dark a few drops of rain began to fall. A large group led by Bill Toomey quickly packed up the large tent before the rains came. Another group quickly packed up the food tent. The weather did not deter the picnic. It lasted well into the night.

The food of course was fantastic. Eating was so much fun. So was overeating. Thank you to everyone who brought such delicious and varied taste treats. This event is very special to all of us, and folks think and work very hard each year to bring something wonderful to share. This year, for example, curiosity and excitement arose when the word was passed around that Jun-ichi Sano brought platters of star and heart shaped cucumber slices from cucumbers that he grew and shaped in his own home garden using special plant shaping-molds that he brought back from Japan.



Eric Johansson at the grill. \*

Thanks go to Eric Johansson for cooking all day at the grill, and for cleaning the grill afterwards too. Thanks go to John and Monique Reed for shopping and bringing the food offered by the club, and for making a second run back to their house for more.

Thanks go to Cheryl Rayner for preparing the huge salad and for getting all of the condiments for the hot dogs and hamburgers prepared and set up. Thanks go to Sai Vallabha for helping out everywhere.

Thanks go to table monitors Al Takeda, Julie Kaufmann, Nina Craven and Cheryl Rayner, and to anyone else, who kept the food tables clean and supplied with utensils, trash removed, set up arriving food, opened ice bags and beverages, and everything else that needed to be done to keep the picnic running smoothly. Al, Julie, Cheryl and Nina had eyes on everything and could be found working everywhere.

Thanks go to the entire committee and everyone else who helped out during the rush to bring the tables and chairs outside and then bring them all back in at dusk. Thanks go to Nina and Eileen for doing the pre-picnic cleaning, and to Al, our go-to-guy, who was subjected to many fix-it-right-now demands. Thanks go to the put-away-the-food crew, which later turned into the take-the food-out-again crew when so many were having a good time and did not want to leave. Thanks go to John Blomquist for mowing the lawn.

So, when you next see any member of the Picnic Committee, consisting of Nina Craven, Julie Kaufmann, Eric Johansson, Eileen Myers, John and Monique Reed, Cheryl Rayner, Al Takeda and Sai Vallabha, with help from Carl Hein, or anyone else mentioned in this article, stop and say thanks to them. I may have missed a name or two, and I apologize, as I was having such a good time I may have missed some of the action going on all around me.

~ Eileen Myers- Member at Large ~

## Lunar X and V . . .

The other night, as we looked at the moon during the break in our Physics class, I mentioned the Lunar X to a few club regulars. Seems it is not that commonly known. So I decided to do a little research and share what I found out with our membership.

Turns out, there is only a small window of time (2-4 hours) six hours before first quarter or six hours after last quarter. The Lunar X is an optical feature created when the light hits the rims of craters Blanchinus, La Caille, and Purbach, forming the letter X for a short time before the sun shines into the craters, and the illusion is gone. Other names for the formation are the Purbach Cross and the Werner X.

The Lunar X is located along the terminator about one-third of the way up from the lunar south pole. It actually stands out from the terminator surrounded by darkness.

Here are the dates and times of the next few apparitions (these calculations were done by Ed Kotapish):

- 10/11/13 15:52 EDT
- 10/26/13 10:12 EDT
- 11/10/13 05:03 EST
- 11/24/13 22:14 EST
- 12/9/13 19:57 EST
- 12/24/13 12:07 EST

At the same time, another letter appears nearer the center of the lunar disc. That is the Lunar V, which is located near the terminator at the same time as the Lunar X. It is formed by two ridges between Mare Vaporum and Sius Medii.

~Submitted by Julie Kauffmann ~

## CCD Cameras For Sale . . .

Two SBIG CCD Cameras for sale exclusively to ATMob members

The club has decided to sell two of its SBIG cameras, an SBIG ST-7 and SBIG ST-9. Each is a monochrome camera with an integrated guider CCD, 5 position color filter wheel and uses a parallel interface to the computer. The ST-9 comes with an optional liquid cooling setup. Each of these cameras comes in a padded carrying case and includes an SBIG Power Supply, parallel cable and 1.25" nosepiece. An important note is that these cameras must be used with Windows XP or older because drivers do not exist (we looked really hard) for Windows 7 or Windows 8, 32-bit or 64-bit. We're uncertain what support exists for Linux or Macintosh OS.

Both of these cameras were returned for cleaning, adjustment and test to SBIG last year. They have remained largely untouched since then.

SPECS:

Camera	CCD	Array Dimensions	Number of Pixels	Pixel Sizes
ST-7	KAF0401E	6.9 x 4.6 mm	765 x 510	9 x 9 μ
ST-9	KAF0261E	10.2 x 10.2 mm	512 x 512	20 x 20 μ

These cameras will be offered exclusively to club members for 30 days.

PRICE:

ST-7 CCD with case, software, parallel cable and 1.25" nosepiece - \$300

ST-9 CCD with case, software, parallel cable and 1.25" nosepiece - \$300

Please contact Bruce Berger ([bruce@scopemaker.com](mailto:bruce@scopemaker.com)) to inspect the cameras.

~ Bruce Berger - Observing Committee Chair ~

Editor: \* Photos by Al Takeda

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**November Star Fields DEADLINE  
Sunday, Oct. 27<sup>th</sup>**

**Email articles to Al Takeda at  
[newsletter@atmob.org](mailto:newsletter@atmob.org)**

**Articles from members are always welcome.**

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**POSTMASTER NOTE:** First Class Postage Mailed October 7, 2013

Amateur Telescope Makers of Boston, Inc.  
c/o Tom McDonagh, Membership Secretary  
48 Mohawk Drive  
Acton, MA 01720  
**FIRST CLASS**

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2006-08 Virginia Renehan (978) 283-0862

**COMMITTEES**

CLUBHOUSE: John Reed (781) 861-8031  
Steve Clougherty (781) 784-3024  
David Prowten (978) 369-1596

OBSERVING: Bruce Berger (978) 387-4189

NEWSLETTER Al Takeda [newsletter@atmob.org](mailto:newsletter@atmob.org)

**PUBLIC OUTREACH**

STAR PARTY COORDINATOR:  
Virginia Renehan [starparty@atmob.org](mailto:starparty@atmob.org)

**How to Find Us...**

**Web Page [www.atmob.org](http://www.atmob.org)**

**MEETINGS:** Held the second Thursday of each month (September to July) at 8:00PM in the Phillips Auditorium, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge MA. For INCLEMENT WEATHER CANCELLATION listen to WBZ (1030 AM)

**CLUBHOUSE: Latitude 42° 36.5' N Longitude 71° 29.8' W**

The Tom Britton Clubhouse is open every Saturday from 7 p.m. to late evening. It is the white farmhouse on the grounds of MIT's Haystack Observatory in Westford, MA. Take Rt. 3 North from Rt. 128 or Rt. 495 to Exit 33 and proceed West on Rt. 40 for five miles. Turn right at the MIT Lincoln Lab, Haystack Observatory at the Groton town line. Proceed to the farmhouse on left side of the road. Clubhouse attendance varies with the weather. It is wise to call in advance: (978) 692-8708.

**Heads Up For The Month . . .**

**To calculate Daylight Saving Time (DST) from Universal Time (UT) subtract 4 hours from UT.**

- Oct 3 Uranus at Opposition
- Oct 11 First Quarter Moon (Moonset at midnight)
- Oct 18 Full Moon. Penumbral Lunar Eclipse
- Oct 21 Orionid Meteor Shower peaks
- Oct 26 Last Quarter Moon (Moonrise at midnight)
- Nov 3 New Moon. Daylight Saving Time Ends (Fall back an hour)
- Nov 10 First Quarter Moon (Moonset at midnight)
- Nov 17 Leonid Meteor Shower peaks
- Nov 17 Full Moon.